



**Faculty of Engineering**

**DEVELOPMENT OF DECANTER CAKE INTO COMMERCIAL  
BY PRODUCT IN SARAWAK**

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**Bachelor of Engineering with Honours  
(Chemical Engineering)  
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UNIVERSITI MALAYSIA SARAWAK

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This declaration is made on the 29 day of MAY 2017.

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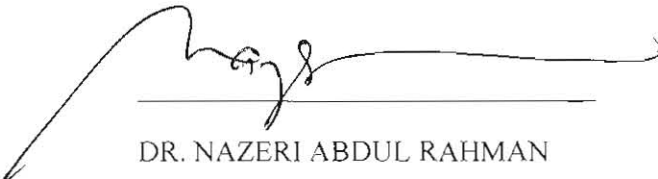
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29 MAY 2017

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DEVELOPMENT OF DECANTER CAKE INTO COMMERCIAL BY PRODUCT  
IN SARAWAK

MUHAMAD SHAIEZAD AIMAN BIN AYUB

A dissertation submitted in partial fulfillment  
of the requirement for the degree of  
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# ABSTRACT

The palm oil production in Malaysia have increase dramatically due to high demand from foreign countries. In Malaysia, there are abundant of biomass wastes produced especially from palm oil industry in which these wastes can be manufactured into new products. During the processing of palm oil mill, significant amount of wastes are produced such as founds, trunk, empty fruit bunch, shells and fiber. These wastes are categorized as biomass wastes. Therefore, this study is conducted to determine the feasibility of utilizing biomass wastes from palm oil mill especially decanter cake as a commercial products particularly as organic and semi-organic fertiliser for oil palm plantation. The study focuses on the state of Sarawak in which a set of questionnaires are developed in order to collect data and information on production of decanter cake produce. In addition, an optimization programing is developed by using matrix method to compare the chemical composition of commercial fertilizer to the decanter cake with organic and inorganic fertiliser especially on percentage of nitrogen, phosphorus and potassium (NPK). Besides that, the produced fertiliser is briquetted and an experiment testing of the product has been conducted to test the ability of fertilizer to absorb water, moisture content of the fertilizer, density and amount of fines produce. It is found that Decanter cake with organic materials are insufficient to supply nutrient as in commercial fertiliser. As such inorganic materials are added to enhance the nutrient composition in which compatible to commercial fertiliser. In term of briquetting properties it found that produced briquette meet the requirement. Therefore, decanter cake feasible to be manufactured as commercial product.

*Keywords : palm oil mill, biomass, decanter cake, fertiliser, briquette*



# ABSTRAK

Pengeluaran minyak sawit di Malaysia terutamanya di Sarawak semakin meningkat disebabkan oleh permintaan yang tinggi dari negara-negara luar. Di Malaysia, sisa-sisa biomass yang paling banyak adalah daripada industri kelapa sawit dan sisa-sisa ini boleh di perbaharui untuk dijadikan bahan baru. Semasa pemprosesan kilang minyak sawit terdapat banyak bahan buangan yang dihasilkan seperti pelepah, batang, tandan buah kosong, tempurung dan serat. Bahan buangan ini adalah salah satu sisa biomass Oleh yang demikian, kajian ini dijalankan untuk menyelidik kebolehan memanfaatkan sisa-sisa biomass daripada industri kelapa sawit khususnya kek decanter kepada produk komersial terutamanya sebagai baja oragnik atau semi organic untuk ladang kelapa sawit. Kajian ini di jalankan di negeri Sarawak dimana kajian soal selidik telah dijalankan untuk mendapatkan maklumat tentang kadar penghasilan kek decanter yang dihasilkan di oleh beberapa buah kilang kelapa sawit di Sarawak. Disamping itu, satu program tentang pengoptimum telah dijalankan dengan menggunakan kaedah matrik untuk membandingkan kandungan kimia baja komersial dan baja kek decanter bersama-sama dengan bahan organik dan tak organik. Kajian tertumpu kepada peratusan nitrogen, fosforus dan kalium (NPK). Selain itu, baja kek decanter yang dihasilkan akan di briket dan kajian eksperimen juga dijalankan untuk mengkaji tentang kebolehan baja tersebut untuk menyerap air, kandungan lembab, ketumpatan, dan serbuk halus baja. Didapati bahawa Decanter kek dengan bahan-bahan organik tidak mencukupi untuk membekalkan nutrien seperti dalam baja komersial. Sebagai bahan bukan organik seperti ditambah untuk meningkatkan komposisi nutrien dalam yang serasi untuk baja komersial. Dari segi sifat-sifat briquetting ia mendapati bahawa briket yang dihasilkan memenuhi keperluan. Oleh itu, kek decanter layak untuk dikeluarkan sebagai produk komersial.

*Kata kunci: kilang kelapa sawit, biomass, kek decanter, baja, briket*



# TABLE OF CONTENTS

	Pages
DECLARATION OF ORIGINAL WORK	i
APPROVAL SHEET	Iii
TITLE PAGE	iv
DEDICATION	v
ACKNOWLEDGEMENT	vi
ABSTRACT	vii
ABSTRAK	viii
TABLE OF CONTENTS	ix
LIST OF TABLES	xvi
LIST OF FIGURES	xx
ABBREVIATIONS	xxiii
NOMENCLATURE	xxv
 1.0 INTRODUCTION	
1.1 Sustainability	1
1.2 Biomass Waste in Malaysia	1
1.3 Palm Oil Industry in Malaysia	2
1.4 Palm Oil Industry in Sarawak	3
1.5 Palm Oil Mill Processing	3

1.6	Palm Oil Mill Waste	4
1.7	Overview of Decanter Cake	5
1.8	Problem Statement	5
1.9	Objective and Scope of Study	6
1.10	Methodology	6
1.11	Significance of Study	7
1.12	Summary	8
<b>2.0</b>	<b>LITERATURE REVIEW</b>	
2.1	Sustainability of Biomass Waste	9
2.2	Overview of Palm Oil Industry in Malaysia	9
2.2.1	Oil Palm Tree	9
2.2.2	Oil Palm Plantation Area	10
2.2.3	Production of Palm Oil	12
2.3	Current Development of Palm Oil Industry in Sarawak	13
2.4	Typical Current Palm Oil Mill Processes	14
2.4.1	Reception, Transfer and Storage of Fresh Fruit Bunches	14
2.4.2	Sterilisation	15
2.4.3	Stripping	16
2.4.4	Digestion and extraction of crude palm oil	16
2.4.5	Clarification and Purification of the	16

	Crude Palm Oil	
2.4.6	Depericarping and Nut Fiber Separation	16
2.4.7	Nut Cracking	16
2.5	Type of Palm Oil Mill Biomass Wastes	17
2.5.1	Empty Fruit Bunch (EFB)	18
2.5.2	Palm Kernel Shell (PKS)	19
2.5.3	Palm Oil Mill Effluent (POME)	21
2.6	Palm Oil Mill Decanter Cake and Utilisation	21
2.7	Briquetting	24
2.7.1	Hydraulic Press	24
2.7.2	Mechanical Piston press	25
2.7.3	The roller press	26
2.7.4	Screw press	27
2.8	Organic Fertilizer	28
2.9	Inorganic Fertilizer	29
2.10	Semi Organic Fertilizer	30
2.11	Summary	30
3.0	<b>METHODOLOGY</b>	
3.1	Introduction	31
3.2	Literature Review	31
3.3	Estimation of Decanter Cake Production in Sarawak	32
3.4	Survey Study	33

3.4.1	Survey Visit to Palm Oil Industry	33
3.5	Conceptual Study (Fertilizer) and Optimization	34
3.5.1	Organic Fertilizer	35
3.5.2	Semi-organic Fertilizer	37
3.6	Fabrication of Densified Fertilizer	39
3.6.1	Raw Materials Preparation	39
3.6.2	Mould Preparation	40
3.6.3	Briquetting Process	40
3.7	Experimental Testing	41
3.7.1	Water absorption	41
3.7.2	Briquette Density	41
3.7.3	Amount of Fines	42
3.7.4	Moisture Content	42
3.8	Summary	43
 4.0	 <b>PRODUCTION OF DECANter CAKE IN SARAWAK</b>	
4.1	Introduction	44
4.2	Amount of decanter cake produced in Sarawak	44
4.3	Summary	47
 5.0	 <b>QUESTIONNAIRE</b>	
5.1	Introduction	48
5.2	Part 1: Personal Information	48

5.3	Part 2: General Plant Operation	48
5.4	Part 3: Information on Decanter Cake	49
5.5	Part 4: General knowledge in organic fertilizers	50
5.6	Summary	52
<b>6.0</b>	<b>QUESTIONNAIRE DATA ANALYS</b>	
6.1	Introduction	53
6.2	Part 1: Personal Information	53
6.2.1	Location of Study	53
6.2.2	Respondent Background	54
6.3	General Plant Operation	54
6.4	Part 3: Information on Oil Palm Decanter Cake	55
6.5	Part 4: General Knowledge in Organic Fertilizers	55
6.6	Summary	56
<b>7.0</b>	<b>OPTIMIZATION</b>	
7.1	Introduction	58
7.2	MPOB F1 Fertilizer	58
7.2.1	Optimization organic materials	58
7.2.2	Optimization inorganic materials	60
7.2.3	Price of New Fertilizer in Comparison to MPOB F1	62
7.3	XTRA K Fertilizer	63

7.3.1	Optimization organic materials	63
7.3.2	Optimization inorganic materials	65
7.3.3	Price of New Fertilizer XTRA K	67
7.4	Summary	68
<b>8.0</b>	<b>EXPERIMENTAL ANALYSIS</b>	
8.1	Introduction	70
8.2	Moisture content test for raw material	70
8.3	Properties of Briquetted Decanter Cake with organic material	71
8.4	Properties of Briquetted Decanter Cake with Inorganic material	75
8.5	Summary	80
<b>9.0</b>	<b>RESULT AND DISCUSSION</b>	
9.1	Introduction	81
9.2	Overall Findings from Decanter Cake Production in Sarawak	81
9.2.1	Area of oil palm in Sarawak	81
9.2.2	Available Fresh Fruit Bunch (FFB) in Sarawak	82
9.2.3	Available of Decanter Cake in Sarawak	83
9.3	Overall Findings from Questionnaire Analysis	85
9.3.1	Respondent Background	85

9.3.2	General Plant Operation	85
9.3.3	Information on Decanter Cake	86
9.4	Overall Results from Optimization	87
9.5	Overall Results from Experimental Testing	89
9.5.1	Density	89
9.5.2	Amount of Fines	91
9.5.3	Moisture Content	92
9.5.4	Water Absorption	94
9.5.5	Overall Findings	95
9.6	Summary	95
10.0	CONCLUSION AND RECOMMENDATION	
10.1	Introduction	96
10.2	Conclusion	96
10.3	Recommendations for Further Works	97
10.4	Summary	97
	BIBLIOGRAPHY	99
	APPENDIX A	105
	APPENDIX B	106
	APPENDIX C	109
	APPENDIX D	113



# LIST OF TABLES

Table		Page
1.1	Types of renewable energy in Malaysia and its energy value	2
1.2	Number and capacities of palm oil sectors, January 2011 (Tonnes/Year)	3
1.3	Type of the palm oil waste	5
1.4	The average initial chemical composition of decanter cake and EFB	5
2.1	Distribution of Oil Palm Area by State in Malaysia	12
2.2	Oil palm plantations area (hectare) in Sarawak for 2008 to 2013	14
2.3	Mature, immature, total and yield oil palm plantations in Sarawak for 2008 to 2013	15
2.4	Type and Appearance of Palm Oil Biomass wastes	19
2.5	The Composition of Empty fruit bunch (EFB)	20
2.6	The chemical and physical properties of Palm Kernel Shell (PKS)	22
2.7	Characteristics of Palm Oil Mill Effluent (POME)	23
2.8	Characteristics of oil palm decanter cake from Alaf Palm Oil Mill	24
2.9	Percentage content of MPOB F1 Fertilizer (%)	25
2.10	Percentage content of XTRA K Fertilizer (%)	25
2.11	Percentage composition of additional sources	25
2.12	Price of additional sources (RM/kg)	25

2.13	The advantages and disadvantages of mechanical piston press	28
2.14	The advantages and disadvantages of screw press	30
2.15	The composition of sources for organic fertilizer	31
3.1	Ratio of amount of starch content to decanter cake	43
4.1	Area of oil palm 2012-2016	49
4.2	Mature, immature, total and yield FFB plantations in Sarawak	50
4.3	Mature oil palm plantation area (hectare) in Sarawak for 2012 to 2016	50
4.4	Amount of fresh fruit bunch in Sarawak (ktonnes) for 2012 to 2016.	51
4.5	Total amount of decanter cake in Sarawak (tonne) from 2012 to 2016	52
6.1	Comparison between Sampadi Palm Oil Mill and Bau Palm Oil Mill	62
7.1	Mixture of decanter cake and chicken poo (MPOB F1)	63
7.2	Mixture of decanter cake and cow dung (MPOB F1)	64
7.3	Mixture of decanter cake and compost (MPOB F1)	65
7.4	Mixture of decanter cake, chicken poo and inorganic materials (MPOB F1)	66
7.5	Mixture of decanter cake, cow dung and inorganic materials (MPOB F1)	67
7.6	Mixture of decanter cake, compost and inorganic materials (MPOB F1)	67

7.7	Total price (RM) of fertilizer from the mixture of decanter cake, chicken poo and inorganic materials (MPOB F1)	68
7.8	Total price (RM) of fertilizer from the mixture of decanter cake, cow dung and inorganic materials (MPOB F1)	68
7.9	Total price (RM) of fertilizer from the mixture of decanter cake, compost and inorganic materials (MPOB F1)	69
7.10	Mixture of decanter cake and chicken poo (XTRA K)	70
7.11	Mixture of decanter cake and cow dung (XTRA K)	70
7.12	Mixture of decanter cake and compost (XTRA K)	71
7.13	Mixture of decanter cake, chicken poo and inorganic materials (XTRA K)	72
7.14	Mixture of decanter cake, cow dung and inorganic materials (XTRA K)	72
7.15	Mixture of decanter cake, compost and inorganic materials (XTRA K)	73
7.16	Total price (RM) of fertilizer from the mixture of decanter cake, chicken poo and inorganic materials (XTRA K)	74
7.17	Total price (RM) of fertilizer from the mixture of decanter cake, cow dung and inorganic materials (XTRA K)	74
7.18	Total price (RM) of fertilizer from the mixture of decanter cake, compost and inorganic materials (XTRA K)	74
8.1	Moisture content for decanter cake and sago starch	76
8.2	Overall results from experimental testing for decanter cake briquette (0% sago starch content)	78
8.3	Overall results from experimental testing for decanter cake briquette (5% sago starch content)	79

8.4	Properties of decanter cake briquettes produced with different amount of sago starch.	81
8.5	Overall results from experimental testing for decanter cake briquette (0% sago starch content).	84
8.6	Overall results from experimental testing for decanter cake briquette (5% sago starch content).	85
8.7	Properties of decanter cake briquettes produced with different amount of sago starch.	83
9.1	Respondents personal information and company background	91
9.2	General plant operation for Sampadi Palm Oil Mill and Bau Palm Oil Mill	92
9.3	Summary data programme for mill	92
9.4	Mixture of decanter cake and organic material	95
9.5	Mixture of decanter cake, organic material and inorganic materials	95

# LIST OF FIGURES

Figure		Page
1.1	Expansion of oil palm cultivation area in Malaysia from 1960 until 2014	3
1.2	A block flow diagram of the palm oil mill process	4
2.1	Type of palm oil fruit	11
2.2	Total area of palm oil cultivation (ha) in Peninsular Malaysia, Sabah and Sarawak from 1975 to 2011	12
2.3	Production of Palm oil in Malaysia	13
2.4	Typical palm oil mill processes	16
2.5	Empty fruit bunch (EFB)	20
2.6	Palm Kernel Shell (PKS)	21
2.7	Schematic of a hydraulic piston press showing its components	26
2.8	Main features of a mechanical briquetting press	28
2.9	Schematic of a roller press briquetting machine	29
2.10	Schematic diagram of screw press	30
3.1	Methodology of flow diagram	35
3.2	Square briquette	43
3.3	Hydraulic jack	44
3.4	Flow for briquetting process	45
5.1	Part 1: Questions on Personal Information.	54
5.2(a)	Part 2: Questions on General Plant Operation	55
5.2(b)	Part 2: Questions on General Plant Operation	55

5.3(a)	Part 3: Information on Decanter Cake	56
5.3(b)	Part 3: Information on Decanter Cake.	56
5.4	Part 4: General knowledge in organic fertilizers	57
6.1	Location map of two different palm oil mills in Western Sarawak	59
9.1	Area of oil palm by division in Sarawak	88
9.2	Total area of oil palm in Sarawak from 2012 to 2013	88
9.3	The amount of FFB produce in Sarawak by division (ktonne) from 2012 to 2016	89
9.4	The total and actual production of FFB in Sarawak from 2012 to 2016	89
9.5	The amount of decanter cake produce in Sarawak by division (ktonne) from 2012 to 2016	90
9.6	Total amount of decanter cake produce in Sarawak (ktonne) from 2012 to 2016	90
9.7	Results of comparison between actual production of decanter cake and amount of decanter cake produced by the mill	93
9.8	Comparison result of optimization between mixture of decanter cake and organic material and mixture of decanter cake, organic material and inorganic materials	95
9.9	Comparison mixed of briquetted decanter cake with organic materials for 0% and 5% sago starch used	97
9.10	Comparison mixed of briquetted decanter cake, organic materials and inorganic materials for 0% and 5% sago starch used	97
9.11	Comparison mixed of briquetted decanter cake with organic materials for 0% and 5% sago starch used	99

9.12	Comparison mixed of briquetted decanter cake, organic materials and inorganic materials for 0% and 5% sago starch used	99
9.13	Comparison mixed of briquetted decanter cake with organic materials for 0% and 5% sago starch used	100
9.14	Comparison mixed of briquetted decanter cake, organic materials and inorganic materials for 0% and 5% sago starch used	100
9.15	Comparison mixed of briquetted decanter cake with organic materials for 0% and 5% sago starch used	101
9.16	Comparison mixed of briquetted decanter cake, organic materials and inorganic materials for 0% and 5% sago starch used	102



# ABBREVIATIONS

AEC	Architecture, Engineering, and Construction
BOD	Biochemical-oxygen-demand
C	Carbon
CaO	Calcium
COD	Chemical-oxygen-demand
CPO	Crude Palm Oil
DC	Decanter Cake
EFB	Empty Fruit Bunches
FFA	Free fatty acid
FFB	Fresh fruit bunches
FRIM	Forest Research Institute Malaysia
H	Hydrogen
K	Potassium
$K_2O$	Potassium
MDF	Medium density fiber
MF	Mesocarp Fibres
Mg	Magnesium
MPOB	Malaysian Palm Oil Board

MPOC	Malaysian Palm Oil Council
N	Nitrogen
$NH_4^+$	Ammonia
NPK	Nitrogen, Phosphorus And Potassium
O	Oxygen
OPEFB	Oil palm empty fruit bunch
OPF	Oil Palm Frond
OPF	Oil Palm Fronds
OPM	Oil Palm Mesocarp
OPS	Oil Palm Shell
OPT	Oil Palm Trunks
P	Phosphorus
$P_2O_5$	Phosphorus
PCK	Palm Kernel Cake
POME	Palm Oil Mill Effluent
PORIM	Palm Oil Research Institute of Malaysia
PPF	Palm Press Fibre
PS	Palm Shell